PROJECT NUMBER: 0400
PROJECT TITLE: Low Density Rod Development
PROJECT LEADER: R. S. Mullins
PERIOD COVERED: November 1988

I. LOW DENSITY ROD

A. **Objective**: Develop a continuous process for the production of reduced density cigarettes.

B. **Results:** Analytical testing of the low density cigarette models produced to determine if reduced cigarette density allows a significant reduction in dilution, at constant delivery, puff count, and RTD has been completed. Analysis of the results by New Products is in progress.

Production of the second set of samples (Marlboro configuration) for Project Tomorrow has been completed. The samples are currently being weight selected prior to packing and testing. Following analytical testing and subjective screening by an expert panel, the cigarettes will be subjectively evaluated by the M/C panel.

Production of samples for the second aftercut tracking study was also completed. However, because of the sample load generated by the Semiworks aftercut work and by the ART program, Flavor Development cannot analyze the samples collected in the study for anethole content. The bottleneck in conducting the analyses is the extraction step, which requires 2 hours per sample. Flavor Development has agreed to train one of our technicians in the extraction process and to analyze the extracted samples.

No significant problems were encountered in ripping bound cigarettes in a test conducted at Stockton Street. The filler yield for the bound cigarettes was 67% while similar unbound cigarettes had a yield of 71%. No problems were encountered with either filler or binder from the bound cigarettes building up in the equipment.

Low density cigarettes were made with wet (15.7% OV) and dry (13.5% OV) batch-coated filler in a preliminary test of the effect of starting OV on cigarette quality. Visually, the wetter filler appeared to produce a better bound rod and to generate less dust and shorts. Sample cigarettes have been submitted to MEL for firmness and loose ends testing. Additional testing is planned to further investigate the effect of starting OV and to determine whether any effect might be attributable to the movement of moisture from the tobacco through the pectin film at higher OVs.

C. **Plans**: Complete the analysis of the samples from the second aftercut study. Design and conduct a test to evaluate the effect of initial filler OV on the firmness of low density cigarettes. Evaluate moisture application to the filler in the chimney using an ultrasonic nozzle. Produce samples having a 40% density reduction for puff x puff TPM analysis to determine if this reduction is sufficient to significantly alter the vapor/particulate ratio of the smoke.

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II. Kaymich Menthol Applicator

A. Objective: Evaluate the Kaymich direct menthol applicator as an alternative mentholation process.

B. Results: Reological studies on both natural and synthetic menthol indicated that crystallization did not begin to occur until the temperature was reduced to 36° C, well below the published freezing point of 42° C. These studies were carried out at shear rates from 0 to 500 inverse seconds, which approximate the shear rates expected in the temperature controlled flow lines and nozzle of the Kaymich unit.

An outside lab, Springborn Laboratories, which can perform thermal analysis of menthol has been identified. Samples of both natural and synthetic menthol have been sent to the lab for determination of transition temperature, heat of fusion, and C_p.

Two nozzles designed to apply menthol directly to the tobacco stream have been received from Kaymich. One nozzle protrudes through the side rail to apply molten menthol to the side of the tobacco stream while the other nozzle applies the menthol to the bottom of the tobacco stream using air atomization. A spare side rail has been obtained from the MC and will be modified as needed to accommodate these nozzles.

The Louisville factory was visited to gain an understanding of the production concerns associated with the current menthol-on-foil application process and to identify potential problems with implementing the Kaymich process. A meeting was also held with Operations Services personnel to discuss manufacturing considerations associated with the Kaymich process.

C. Plans: Assist New Products in producing samples for an aging study to compare the analytical and subjective performance of cigarettes produced via the Kaymich and menthol-on-foil processes. Install and evaluate the nozzles designed to apply menthol directly to the tobacco stream.

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